



Advanced Biofuels Task Force Report

Commonwealth of
Massachusetts

Spring 2008



Acknowledgments

The Advanced Biofuels Task Force would like to thank those who contributed to the development of this report. In particular, we acknowledge the work of U.S. **Representative William Delahunt**, who has been a state and national leader on advancing the development of biofuels.

We also would like to acknowledge all those who provided oral and/or written testimony (see Appendix C for a complete list), plus the following individuals: **Shannon Ames** (staff for Senator Resor), **Kathy Baskin** (EEA), **Linda Benevides** (EEA), **Dwayne Breger** (DOER), **Marc Breslow** (EEA), **Ben Bunker** (DOER intern), **Lisa Capone** (EEA), **Steven Clarke** (EEA), **Brooke Coleman** (New Fuels Alliance), **Lisa Conley** (staff for Representative Smizik), **Coralie Cooper** (NESCAUM), **James Cope** (EOT), **Jennifer Crawford** (staff for Representative Dempsey), **Zachary Crowley** (staff for Representative Smizik), **Michael Ferrante** (Massachusetts Oilheat Council), **Ian Finlayson** (EEA), **John Fischer** (DEP), **David Howland** (DEP), **Chris Kealey** (MTC), **Robert Keough** (EEA), **Christine Kirby** (DEP), **Steven Larrabee** (staff for Representative Jones), **Judith Laster** (staff for Speaker DiMasi), **Michelle Manion** (NESCAUM), **Joanne McBrien** (DOER), **Patricia Moynihan** (staff for Representative Dempsey), **Sudhir Nunes** (MTC), **Christine Raisig** (MTC), **Arthur Robert** (MOBD), **Sara Schnitzer** (staff for Senator Resor), **Nancy Seidman** (DEP), **Teresa Sousa** (EEA), **Bethann Steiner** (staff for Senator Downing), **Jeannine Wheaton** (DOR), and **Christine Williams** (EOHED).

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The Commonwealth of Massachusetts Advanced Biofuels Task Force

April 16, 2008

Dear Governor Patrick, Senate President Murray, and Speaker DiMasi:

In November 2007, you created the Advanced Biofuels Task Force and directed us to "develop a strategic framework to accelerate the development and deployment of commercially viable advanced biofuels, and facilitate expansive biofuel research throughout the Commonwealth." We present this report to you in fulfillment of our charge.

While there are detailed findings and recommendations throughout the report, our proposals to aggressively move an advanced biofuels sector forward while maintaining high environmental standards include the following priorities:

- Prioritize efforts to achieve near-term implementation of a regional, technology-neutral and performance-based Low Carbon Fuel Standard (LCFS), with Massachusetts leading the way.
- While a Massachusetts LCFS is being developed, pass amended versions of the legislation you co-sponsored, implementing targeted transitional biofuels mandates and exempting cellulosic biofuels from the state gasoline tax, with a sunset date. Both the transitional mandates and cellulosic fuel exemption should require significant greenhouse gas reductions and other environmental protections, including direct and indirect impacts such as those on land use. The mandates and cellulosic tax exemption should be as technology-neutral as possible, and should phase out as a Low Carbon Fuel Standard comes into existence.
- Support pilot deployment in the state fleet of plug-in hybrid and all-electric vehicle technology in light- and heavy-duty vehicles, as well as fuel-efficient flex-fuel vehicles.
- Develop infrastructure necessary for consumer use of biofuels and implement limited-cost investments in equipment for ethanol and biodiesel distribution, such as E85 stations along major state highway corridors, subject to budget constraints.
- Develop standards for full lifecycle evaluation of biofuels that consider their carbon and other environmental impacts, including direct and indirect land use impacts.
- Parallel to progress on biofuels, continue to explore policy options for vehicle efficiency and reducing vehicle miles traveled.

We developed these and other recommendations outlined in the full report through a robust process of analysis and public engagement. Biofuels policy can be complicated and contentious. Nevertheless, we have arrived at a set of recommendations that allows the Commonwealth to aggressively seize the economic opportunities you foresaw, while also protecting the environment and combating climate change. It is clear to us that, with the appropriate safeguards, advanced biofuels can and should be a central part of the Commonwealth's clean energy strategy.

The potential for economic growth, environmental protection, and the improvement of our energy security is significant. Out of respect for the magnitude of this task, we held public hearings throughout the state to learn from academic institutions, communities, environmental groups and industry representatives the lessons they have learned and the wisdom they wished to pass along. This included input on research and development, production, commercialization, distribution, and utilization. We have tapped into expertise close to home and around the world, explored what other states and countries have implemented or are in the process of implementing, and reviewed the most current scientific research.

We hope that these recommendations will be of use to you in considering legislative and administrative actions to promote the development of an advanced biofuels industry in the Commonwealth. We look forward to following up with you in the coming weeks.

Sincerely,



Secretary Ian A. Bowles
Energy and Environmental Affairs
(Chair)



Senator Pamela P. Resor
Chair, Joint Committee on Environment,
Natural Resources and Agriculture



David W. Cash
Energy and Environmental Affairs
(Secretary's designee)



Senator Benjamin B. Downing
Chair, Senate Committee on Ethics and Rules



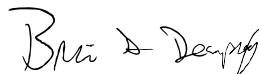
Bruce A. Jamerson
CEO, Mascoma



Senator Bruce E. Tarr
Assistant Minority Leader



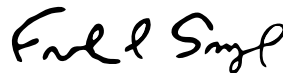
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President, Mascoma (designee)



Representative Brian S. Dempsey
Chair, Joint Committee on
Telecommunications, Utilities, and Energy



David S. Davenport
Department of Revenue



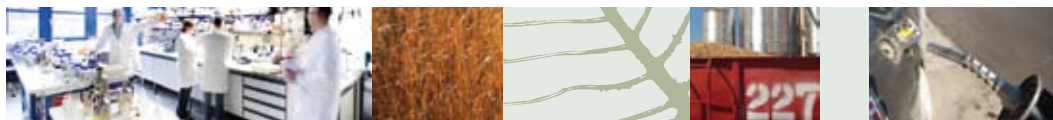
Representative Frank I. Smizik
Chair, Joint Committee on Environment,
Natural Resources and Agriculture



Representative Bradley H. Jones, Jr.
Minority Leader

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Report of the Advanced Biofuels Task Force EXECUTIVE SUMMARY

In November 2007, the Governor, Senate President and Speaker of the House announced the creation of an Advanced Biofuels Task Force to “promote the development of an advanced biofuels industry in the Commonwealth.” At that time, the price of oil was about \$85 per barrel. In the five months the Task Force has been doing its work, the price has risen roughly 30%, reaching \$110 per barrel. By itself, the dramatically rising cost of energy would be



*GOVERNOR DEVAL PATRICK STRESSES THE
POTENTIAL OF ADVANCED BIOFUELS*

reason enough for Massachusetts to seek alternatives to imported fossil fuels. But there are many more reasons—the opportunity to become the global center for advanced biofuels; growth of jobs in R&D, production and commercial applications; and reduction in harmful emissions.

In this context, the Task Force was charged with drafting a strategy to seize opportunities related to biofuels development and explore their economic, energy, and environmental benefits and costs. This report outlines such a strategy. It is the result of intensive work by the Task Force, legislative and executive staff, four public hearings throughout the Commonwealth, and input from academic experts as well as a wide range of industry, environmental, community, and other stakeholders.

Biofuels are substitutes for liquid petroleum fuels, including gasoline, diesel, and heating

oil, that are derived from renewable organic matter and promise several advantages over fossil fuels. Petroleum products used for transportation currently contribute more than a third of greenhouse gas emissions in Massachusetts. Due to limitations in domestic supplies, reliance on petroleum makes the U.S. dependent on imports from foreign nations, many of them politically unstable. And Massachusetts, having no supplies of our own, pays high prices for imports from around the country and around the world.

Advanced biofuels, which are defined in federal law as those that yield a net lifecycle reduction of at least 50% in greenhouse gas emissions compared with fossil fuels, offer particular advantages for the environment as well as the Massachusetts economy—including playing to our strengths in research and technology development and sustainable forestry.

This Executive Summary briefly reviews the main findings of the Task Force’s report and provides the policy recommendations resulting from its deliberations. The report has six chapters:

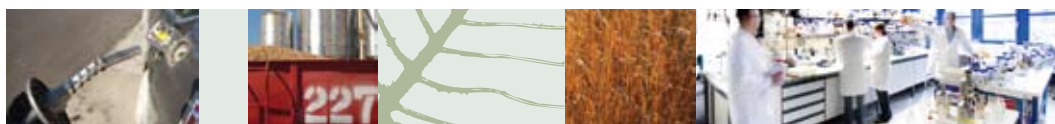
Chapter 1 – The Potential Economic Opportunities of an Advanced Biofuels Sector in Massachusetts



*SPEAKER SALVATORE DiMASI ADDRESSES
THE AUDIENCE ON BIOFUELS*



*SENATE PRESIDENT THERESE MURRAY
SPEAKING AT THE ANNOUNCEMENT*



Chapter 2 – The Energy and Environmental Lifecycle of First-Generation and Advanced Biofuels

Chapter 3 – Biofuel Feedstocks—Energy Crops, Biomass, and Waste Products

Chapter 4 – Statutory and Regulatory Mandates, Regulatory Flexibility

Chapter 5 – Promoting Infrastructure for Delivery and Distribution of Biofuels

Chapter 6 – Grants, Loans, and Tax Incentives

Chapter 1 – The Potential Economic Opportunities of an Advanced Biofuels Sector in Massachusetts

Given the state's intellectual capital and academic and laboratory resources for research and development, supporting an advanced biofuels sector offers potentially significant opportunities for economic development and job creation.



CONGRESSMAN WILLIAM DELAHUNT
SPEAKING AT THE ANNOUNCEMENT

In-state production of advanced biofuels derived from feedstock grown in Massachusetts could replace about 6% of our gasoline use, reducing our dependence on imported energy sources while generating jobs at home and boosting the state's growing energy sector. Biofuels have the potential to keep marginal agricultural land in production—a benefit for a state like Massachusetts, which values small-scale farming as part of its economic and physical landscape.

As an emerging technology, the economic viability of advanced biofuels still needs to be proven, however, and will depend significantly on the true extent of the greenhouse gas reductions these fuels provide.

The Task Force estimates that a mature advanced biofuels industry—including technology development, feedstock cultivation, and processing into fuel—could contribute \$280 million to \$1 billion per year for the Massachusetts economy by 2025, while generating 1,000 to 4,000 permanent jobs and 150 to 760 temporary construction jobs. Including indirect “multiplier” effects, we estimate the permanent gains as \$550 million to \$2 billion and 2,500 to 9,800 jobs.

Chapter 2 - The Energy and Environmental Lifecycle of First-Generation and Advanced Biofuels

Depending on the feedstocks utilized (corn, soybeans, waste oil, switchgrass, tree trimmings, the organic portions of municipal solid waste), the energy source used to convert the feedstocks (coal, natural gas, renewables), and the land on which the feedstocks are grown (land already in production, forests or grasslands converted to croplands), biofuels can either reduce or increase greenhouse gas emissions relative to fossil fuels.

Without considering indirect impacts from changes in land use, corn ethanol could reduce greenhouse gases by approximately 20% relative to petroleum, possibly more if production processes are improved. Soybean-based biodiesel gets much better initial reviews, with greenhouse gas benefits estimated to be in the 70% range.

But recent research finds that it is critical to take land use changes into account. Shifting a substantial part of the world's food supply to fuel production is likely to cause forests and grasslands to be converted to crop farming somewhere in the world. It would take decades for future crops planted on these lands to absorb the amount of carbon dioxide that is released (due to burning and decomposition of trees, plants and soil) when they are initially cleared for farming.



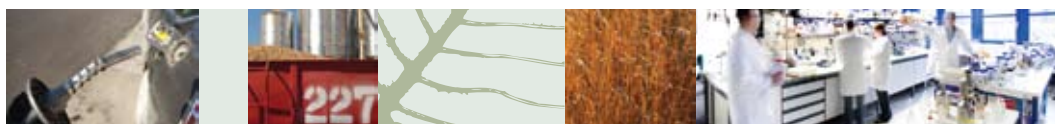
As a result of direct and indirect changes in land use, use of corn ethanol, soy biodiesel, and other crop-based fuels may result in even greater greenhouse gas emissions than burning gasoline and petroleum diesel, though it is essential to use direct and indirect impacts of petroleum production in any comparison to biofuels production. The scientific analyses for true “apples to apples” comparisons are still being developed, so no firm conclusions can be drawn.

Better environmental results are expected from advanced biofuels, such as those derived from cellulosic sources. Cellulosic fuels, including cellulosic ethanol, can be made from feedstocks such as tree trimmings and switchgrass, which require little or no fertilizer or pesticides. They can be grown on agriculturally marginal lands and thus do not necessarily compete with food production. As a result, they may yield as much as a 90% reduction in carbon dioxide emissions compared with gasoline. But since cellulosic fuel is not yet produced on a commercial scale and the technology is still evolving, there are still uncertainties about environmental impacts—though compared with first generation biofuels, these advanced biofuels offer much promise.

Recommendations of the Task Force:

1. Develop standards for lifecycle evaluation that consider the carbon and environmental impacts of biofuels, including potential impacts on agricultural, forest and other land use in Massachusetts and on a global basis, using definitions like those employed in California and included in the new federal energy law. These evaluations must include both direct and indirect impacts, as well as consideration of impacts on environmental justice. Due to the complexity of lifecycle analysis, to the extent possible Massachusetts should make use of analyses done by other parties, including the California Air Resources Board, U.S. EPA, and the European Union.
2. Lifecycle evaluation methods should put biofuels, petroleum fuels, and other energy sources for vehicles (such as electricity and hydrogen) on a level playing field, assessing secondary and indirect impacts for all.
3. To receive state support for biofuels development and/or use, a particular biofuel must provide a substantial reduction in greenhouse gas emissions relative to petroleum fuels on a lifecycle basis.
4. The state should ensure that developers of refineries meet stringent water discharge limits and select technologies that reduce water needs.
5. Since biofuel made from in-region waste materials, such as waste oils, is likely to have lower greenhouse gas and environmental impacts than biofuel from virgin materials, state agencies should have the latitude to exempt fuel produced from waste materials from a full lifecycle greenhouse gas emissions analysis. However, state agencies should require a review that considers the highest reuse option for the waste feedstock (including recycling) and conduct appropriate environmental reviews of biofuel production processes that seek to minimize potential air and water impacts, as well as chemical and energy use.
6. Support the development and implementation of fuel quality standards (for example, federal ASTM standards) to provide consumer assurance of reliability of advanced biofuels.





Chapter 3 – Biofuel Feedstocks—Energy Crops, Biomass, and Waste Products

In comparison with other states, Massachusetts is not a large agricultural producer, and so has limited potential to benefit economically from

first-generation crop-based biofuels such as corn ethanol and soy biodiesel.

The Commonwealth has greater potential to capitalize on second-generation, or advanced, cellulosic feedstocks such as agricultural switchgrass, willow and crambe

(an industrial oil crop that grows well in cool climates), agricultural waste products (such as cranberry waste), forest residues and wood from sustainably managed forests, and the organic component of municipal solid waste. Potential benefits include keeping marginal or threatened agricultural lands in production, providing income from open lands not currently in agricultural production, displacing imported fuels, and providing a market for waste oils.

Total in-state feedstocks could replace roughly 6% of petroleum imports, although these same materials are also under consideration for use in electricity generation and thermal applications, where they might displace coal, natural gas, or petroleum fuel, and potentially be used for transportation via plug-in hybrid or electric car technology.

Recommendations of the Task Force:

Note: A variety of tax and other state incentives have the potential to support the development of advanced biofuels feedstocks in the Commonwealth. Recommendations relating to state incentives are discussed in detail in Chapter 6.

1. Conduct additional field trials and commercial demonstration plots on biomass crops in Massachusetts to determine optimal crops, production methods and costs for the state. Trials on marginal agricultural land and other working landscapes are of particular interest. Evaluation of these trials should include environmental impacts (including carbon emissions and soil sequestration) and infrastructure needs for planting, harvesting, and transporting materials.
2. Expand a preliminary UMass study on economic potential of energy crops in Massachusetts to include other crops and non-agricultural marginal lands and to improve yield and cost assumptions. Develop a spatial model illustrating potential lands that may be conducive to biomass crops.
3. Support development work (genomic and breeding) on energy crops such as crambe and switchgrass, to improve crop yields and biofuel production.
4. Explore opportunities to promote algae production by the Massachusetts aquaculture industry, and bioengineering research at Massachusetts companies and universities.
5. Conduct an internal review of all state agricultural preservation and assistance programs for the purpose of integrating energy crop production. Explore the benefit of establishing capacity at the state Department of Agricultural Resources and UMass Extension to provide outreach and training to farmers and other landowners interested in establishing early commercial plantations.
6. Complete the current work of the Massachusetts Sustainable Forest Bioenergy Initiative on woody residue and forest biomass feedstock and consider



the potential use of this feedstock for production of cellulosic ethanol.

7. Work with the federal government to support biorefinery technologies and demonstration projects that can be developed on smaller scales to utilize locally available fuel, including waste feedstocks.
8. Investigate the feasibility and design of a statewide program to increase the collection of waste vegetable oil and grease trap waste from restaurants and institutional kitchens and transportation of these wastes to biofuel production facilities. The investigation should consider needs for collecting, transporting and processing these wastes, and the use of technical assistance, incentives and mandates to accomplish these goals.
9. Due to the inherent environmental benefits of reusing waste products over virgin sources of biofuels, give state environmental agencies the authority to reduce or provide exemptions from greenhouse gas emissions lifecycle analysis requirements when applied to biofuels produced from waste feedstocks.
10. Further investigate the applicability of cellulosic waste materials, including the organic portions of municipal solid waste, paper sludge, and construction and demolition debris, for cellulosic ethanol production, while maintaining strict regulatory controls to ensure that no increases in toxics or other pollutants take place.

Chapter 4 - Statutory and Regulatory Mandates, Regulatory Flexibility

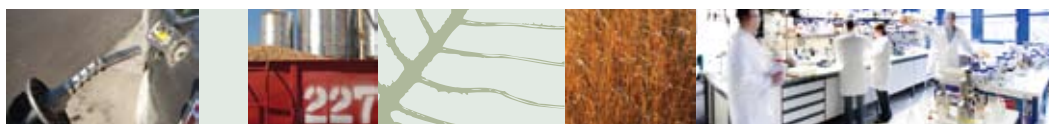
This chapter addresses the principal statutory and regulatory mechanisms available to promote biofuels: a Low Carbon Fuel Standard and content mandates. It also suggests the need for regulatory flexibility to facilitate pilot demonstrations of new technologies.

Content mandates, like those in the federal Energy Independence and Security Act of 2007, require the use of specified amounts of particular biofuels. Some states have enacted content mandates, although in the Northeast they generally apply only to fuel use by state vehicles.

Legislation filed by Governor Patrick, Senate President Murray, and House Speaker DiMasi in November 2007 would exempt cellulosic ethanol from the state gasoline tax and set minimum requirements for the use of biodiesel blends in diesel motor vehicle fuel and Number 2 heating oil sold in the state. The Task Force supports this legislation with amendments that would make it more performance-based and technology-neutral, as well as addressing implementation issues and the need for a transition to a Low Carbon Fuel Standard.

A Low Carbon Fuel Standard (LCFS) is a performance-based, technology-neutral approach that sets limits on greenhouse gas emissions without mandating specific fuel content. It allows the market to drive the development of alternative fuels and technologies at the lowest cost. California is currently developing regulations to implement its LCFS, which would require a reduction of 10% by 2020 in the carbon intensity, on a lifecycle basis, of vehicle fuel sold in California. By not picking winners among technological alternatives to petroleum propulsion, the LCFS allows the best approaches to powering vehicles to win out over time, whether they be biofuels, all-electric vehicles, plug-in hybrids, or hydrogen

Legislation filed by Governor Patrick, Senate President Murray, and House Speaker DiMasi in November 2007 would exempt cellulosic ethanol from the state gasoline tax and set minimum requirements for the use of biodiesel blends in diesel motor vehicle fuel and Number 2 heating oil sold in the state.



fuel cells. Because the market for fuels in the Northeast is regional, rather than state-by-state, and the LCFS is a complex tool, it would be far preferable to implement it on a regional basis.

Recommendations of the Task Force:

1. Prioritize efforts to achieve near-term implementation of a regional, technology-neutral and performance-based Low Carbon Fuel Standard. Position Massachusetts as a leader in this regional development. Given the uncertainty of regional coordination, however, the Commonwealth should also move forward without delay in designing a Massachusetts-specific LCFS that other states and provinces can adopt. The Standard should include lifecycle greenhouse gas reduction standards, as discussed in Chapter 2 of this report, and should reward companies for performance-based results in achieving such reductions.
2. Consider incentives to promote the best uses of sustainably harvested biomass, whether as a replacement for transportation fuels or in other energy applications, such as a liquid fuel substituting for heating oil or as a solid fuel used directly for space heating and/or electricity generation. This would move the state farther along the continuum of being technology-neutral, searching for the most cost-effective means of reducing petroleum use and greenhouse gas emissions.
3. While a Massachusetts Low Carbon Fuel Standard is being developed, implement transitional, carefully targeted mandates, such as requirements for minimum percentages of biodiesel in motor and heating fuel. Mandates should require that the fuels yield substantial lifecycle greenhouse gas reductions, including direct and indirect impacts such as those on land use, while not increasing the release of other pollutants; and should be
4. The state should ensure that temporary, pilot scale biorefineries are allowed to proceed after review of appropriate environmental safeguards and evidence that the pilot's results will be useful if it succeeds. Analysis of potential contaminants contained in or produced from the processing of waste products such as construction and demolition waste, the organic fraction of municipal solid waste, and biosolids from wastewater treatment plants. MassDEP should review its regulatory authority to determine whether revisions are needed to allow pilot scale waste-to-fuel production. MassDEP should assist in the review of pilot scale projects (whether or not they need a permit) to ensure that, when a proponent seeks approval for a commercial project, those permits can be issued in a timely manner.
5. The state should support the demonstration of operational, maintenance and environmental impacts from the use of waste-based renewable fuels in commercial boilers or turbines. Funding for the purchase of biofuels and to oversee tests done at state facilities may be needed. State environmental agencies should adopt reasonable reporting requirements for those deciding to burn advanced fuels. The continued use of existing permitted fuel, if the advanced biofuel is unavailable, should be allowed.
6. Further research and analysis should be done to evaluate the benefits and costs of policies to support biofuels development

A Low Carbon Fuel Standard is a performance-based, technology-neutral way to set limits on greenhouse gas emissions without mandating specific fuel content. By not picking winners among technological alternatives, the LCFS allows the best approaches to powering vehicles to win out over time.



through a regulatory framework, including those in (3) above, on an expedited timeline.

Chapter 5 – Promoting Infrastructure for Delivery and Distribution of Biofuels

For Massachusetts to become a national leader in the development and use of advanced biofuels as a substitute for petroleum, the infrastructure for biofuels delivery and distribution will have to be in place. Consumers will need to be able to use biofuels in their vehicles and homes in order to make them a true alternative to petroleum products.

The Commonwealth has no crude oil production, no refining capacity, and no direct service by a major interstate petroleum pipeline. All petroleum products are imported from two main sources: domestic refined products, originating in the Gulf Coast, and imports supplied primarily by Canada, Venezuela and the U.S. Virgin Islands.

While ethanol and biodiesel are both used almost exclusively in blends with petroleum, their supply chain and infrastructure needs differ significantly. For biofuels to transition successfully from the current usage of corn- and soy-based feedstocks in low blends into a significant industry in the region, accommodations will be needed in the mechanisms by which Massachusetts meets its fuel needs in transportation, heating, and other uses—mechanisms that are now geared almost exclusively to the use of petroleum products.

Recommendations of the Task Force:

1. Implement limited-cost investments in infrastructure for ethanol and biodiesel, subject to budget constraints, such as E85 stations along major state highway corridors, and possible assistance for storage and distribution of biodiesel.
2. Study the benefits and costs of measures to increase the share of flex-fuel vehicles in Massachusetts, including mandates and incentives. Such research should take into account both short- and long-term impacts on actual greenhouse gas emissions and other environmental concerns. Explore policies to induce automakers to provide more fuel-efficient flex-fuel vehicle models than are currently available. For its own fleet, the state should purchase flex-fuel vehicles that exceed the average CAFE standard mileage requirements for each vehicle class.
3. Subject to state budget constraints, provide incentives to encourage development of smaller regional biorefineries, especially for cellulosic biofuels, that utilize locally available fuel including waste feedstocks.
4. Support pilot deployment of plug-in hybrid and all-electric vehicles, including flex-fuel plug-in hybrid vehicles, in both light-duty and heavy-duty vehicle classes.
5. Investigate the costs and benefits of incentives for additional heated storage tanks and blending infrastructure at regional terminals.
6. Support rail freight infrastructure for biofuels as part of a broader policy of promoting rail over road freight transportation.





Chapter 6 - Grants, Loans, and Tax Incentives

Aggressive expansion of an advanced biofuels industry holds the promise of jobs and economic growth as part of a larger clean energy sector that capitalizes on Massachusetts's advantages in technology, venture capital, sustainable forestry and a highly skilled workforce. In addition, advanced biofuels offer the prospect of environmental benefits in the form of reduced greenhouse gas emissions as they displace the use of imported petroleum in our engines and furnaces. Reducing oil imports is also vital to the energy security of the U.S. as a whole. To realize this promise of global leadership, job creation and retention, economic growth, and environmental benefits, Massachusetts should begin rigorous benefit-cost analysis to identify the financial tools that can develop the sector. Such an effort must necessarily account for revenue impacts and direct and indirect environmental impacts.

As a general matter, state governments have the ability to use their own financial resources to aid particular industries whose growth they see as being in the public interest. Generally, the instruments at their disposal for this purpose include grants, loans, and the state tax code. Massachusetts has used these tools in recent years to provide targeted assistance in a number of areas, including for manufacturers, R&D companies, biotechnology, and the film industry. This chapter discusses the applicability of these options to the emerging biofuels industry, and makes recommendations about how to tailor state financial incentives to maximize the industry's potential in the Bay State.

Most existing federal and state biofuel subsidies, including various tax incentives, are designated for first generation biofuels, mainly corn-based ethanol and soy-based biodiesel. Such policies are common in states with large agricultural

sectors, but would have relatively little potential for providing economic benefits in Massachusetts. Advanced, or cellulosic-based, fuels are more promising candidates for support from the Commonwealth, since we have greater ability to supply feedstock for them and produce them.

Recommendations of the Task Force:

1. Exempt cellulosic biofuels from the state's gasoline tax, with a sunset date. An excise tax exemption will encourage fuel distributors to purchase cellulosic ethanol when available, and minimize the risk associated with investment in cellulosic biofuel development.
2. Conduct rigorous benefit-cost analysis of prospective financial support policies for the biofuels industry, comparing benefits (including greenhouse gas reduction, employment gains, energy security, and tax revenues from economic development) with costs (including environmental impacts, state budgetary costs, and consumer/business expenses).
3. Subject to state budget constraints and lifecycle environmental and greenhouse gas criteria, consider the use of production tax credits and other tax incentives targeted at advanced biofuels production and commercialization in those cases where analysis shows that projected benefits exceed costs. To better assist pre-profit firms, study the implications of making tax credits refundable or transferable.
4. Subject to budget constraints, consider the costs and benefits of implementing state tax credits for the production of in-state biofuel and biomass feedstocks from managed forests and the cultivation of energy crops.



Benefits to be considered should include stimulating investment in forestry and agriculture, improving the market demand and competitiveness of these feedstocks relative to residue sources of woody biomass, and maintaining and improving the Commonwealth's working landscapes. (See discussion in Chapter 3)

5. Subject to budget constraints, authorize state funding for research in partnership with private companies and universities to improve existing technologies for converting wastes, including cranberry and other agricultural residues, to carbon-reducing, environmentally beneficial fuels. Before putting such technologies to work on a wide scale, however, subject the diversion of waste products for biofuels to full environmental and economic analysis. (See discussion in Chapter 3)
6. Subject to state budget constraints and lifecycle environmental and greenhouse gas criteria, create a fund that would provide grants and loans to attract advanced biofuels R&D, demonstration, and

production facilities to the Commonwealth in those cases where analysis shows that projected benefits exceed costs.

7. Phase out financial incentives for producers and consumers of biofuels with implementation of a Low Carbon Fuel Standard, since the standard will provide durable incentives to achieve greenhouse gas reductions and displacement of petroleum fuels at the lowest cost to consumers on a performance-based, technology-neutral basis. However, R&D incentives may have a longer-term role in state support for the industry.
8. Include biofuels in priorities for state-level research on renewable energy, presumably associated with a state college or university. This educational institution should take the lead in identifying and pursuing federal funding in collaboration with biofuels companies.



GOVERNOR PATRICK, SENATE
PRESIDENT MURRAY, AND SPEAKER
OF THE HOUSE DIMASI ANNOUNCED
THE CREATION OF AN ADVANCED
BIOFUELS TASK FORCE